AMENDMENTS TO THE CLAIMS

1. (Original) A method, comprising:

providing a wafer having a first grating structure and a second grating structure formed in a photoresist layer;

illuminating at least a portion of the first and second grating structures with a light source;

measuring light reflected from the illuminated portion of the first and second grating structures to generate a reflection profile; and

determining misregistration between the first and second grating structures based on the reflection profile.

2. (Original) The method of 1, wherein providing the wafer further comprises:

forming the photoresist layer above the wafer;

patterning the first grating structure using a first photomask; and

patterning the second grating structure using a second photomask.

3. (Original) The method of 2, wherein patterning the first grating structure further comprises patterning the first grating structure using a phase shift photomask and patterning the second grating structure further comprises patterning the second grating structure using a binary photomask.

4. (Original) The method of 2, wherein forming the first grating structure further comprises forming a first plurality of lines and forming the second grating structure further comprises forming a second plurality of lines.

5. (Currently Amended) The method of 4, wherein forming the second plurality of lines further comprises forming the second plurality of lines adjacent the first ~~second~~ plurality of lines.

6. (Currently Amended) The method of 4, wherein forming the second plurality of lines further comprises forming the second plurality of lines interleaved with respect to the first ~~second~~ plurality of lines.

7. (Original) The method of 1, further comprising determining at least one parameter of an operating recipe for a photolithography stepper based on the determined misregistration.

8. (Original) The method of claim 7, wherein determining at least one parameter of the operating recipe of the photolithography stepper comprises determining at least one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, a reticle rotation parameter, a wafer rotation parameter, and a wafer non-orthogonality parameter.

9. (Original) The method of claim 1, wherein determining the misregistration further comprises:

comparing the generated reflection profile to a library of reference reflection profiles, each reference reflection profile having an associated misregistration metric;

selecting a reference reflection profile closest to the generated reflection profile; and

determining the misregistration based on the misregistration metric associated with the selected reference reflection profile.

10. (Original) The method of claim 1, wherein determining the misregistration further comprises:

comparing the generated reflection profile to a target reflection profile; and

determining the misregistration based on the comparison of the generated reflection profile and the target reflection profile.

11. (Original) The method of claim 1, wherein generating the reflection profile comprises generating the reflection profile based on at least one of intensity and phase of the reflected light.

12. (Original) The method of claim 1, further comprising identifying a fault condition based on the determined misregistration.

13. (Original) The method of claim 2, wherein providing the wafer further comprises developing the photoresist layer to define the first and second grating structures prior to illuminating the first and second grating structures.

14. (Original) A method, comprising:

providing a wafer having a first grating structure and a second grating structure formed in a photoresist layer;

illuminating at least a portion of the first and second grating structures with a light source;

measuring light reflected from the illuminated portion of the first and second grating structures to generate a reflection profile;

comparing the generated reflection profile to a library of reference reflection profiles, each reference reflection profile having an associated misregistration metric;

selecting a reference reflection profile closest to the generated reflection profile; and

determining misregistration between the first and second grating structures based on the misregistration metric associated with the selected reference reflection profile.

15. (Original) The method of 14, wherein providing the wafer further comprises:

forming the photoresist layer above the wafer;

patterning the first grating structure using a first photomask; and

patterning the second grating structure using a second photomask.

16. (Original) The method of 15, wherein patterning the first grating structure further comprises patterning the first grating structure using a phase shift photomask and patterning the second grating structure further comprises patterning the second grating structure using a binary photomask.

17. (Original) The method of 15, wherein forming the first grating structure further comprises forming a first plurality of lines and forming the second grating structure further comprises forming a second plurality of lines.

18. (Currently Amended) The method of 17, wherein forming the second plurality of lines further comprises forming the second plurality of lines adjacent the first ~~second~~ plurality of lines.

19. (Currently Amended) The method of 17, wherein forming the second plurality of lines further comprises forming the second plurality of lines interleaved with respect to the first ~~second~~ plurality of lines.

20. (Original) The method of 14, further comprising determining at least one parameter of an operating recipe for a photolithography stepper based on the determined misregistration.

21. (Original) The method of claim 20, wherein determining at least one parameter of the operating recipe of the photolithography stepper comprises determining at least one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, a reticle rotation parameter, a wafer rotation parameter, and a wafer non-orthogonality parameter.

22. (Original) The method of claim 14, wherein generating the reflection profile comprises generating the reflection profile based on at least one of intensity and phase of the reflected light.

23. (Original) The method of claim 14, further comprising identifying a fault condition based on the determined misregistration.

24. (Original) The method of claim 15, wherein providing the wafer further comprises developing the photoresist layer to define the first and second grating structures prior to illuminating the first and second grating structures.

25. (Original) A method, comprising:

providing a wafer having a first grating structure and a second grating structure formed in a photoresist layer;

illuminating at least a portion of the first and second grating structures with a light source;

measuring light reflected from the illuminated portion of the first and second grating structures to generate a reflection profile;

comparing the generated reflection profile to a target reflection profile; and

determining misregistration between the first and second grating structures based on the comparison of the generated reflection profile and the target reflection profile.

26. (Original) The method of 25, wherein providing the wafer further comprises:

forming the photoresist layer above the wafer;

patterning the first grating structure using a first photomask; and

patterning the second grating structure using a second photomask.

27. (Original) The method of 26, wherein patterning the first grating structure further comprises patterning the first grating structure using a phase shift photomask and patterning the second grating structure further comprises patterning the second grating structure using a binary photomask.

28. (Original) The method of 26, wherein forming the first grating structure further comprises forming a first plurality of lines and forming the second grating structure further comprises forming a second plurality of lines.

29. (Currently Amended) The method of 28, wherein forming the second plurality of lines further comprises forming the second plurality of lines adjacent the first ~~second~~ plurality of lines.

30. (Currently Amended) The method of 28, wherein forming the second plurality of lines further comprises forming the second plurality of lines interleaved with respect to the first ~~second~~ plurality of lines.

31. (Original) The method of 25, further comprising determining at least one parameter of an operating recipe for a photolithography stepper based on the determined misregistration.

32. (Original) The method of claim 31, wherein determining at least one parameter of the operating recipe of the photolithography stepper comprises determining at least one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, a reticle rotation parameter, a wafer rotation parameter, and a wafer non-orthogonality parameter.

33. (Original) The method of claim 25, wherein generating the reflection profile comprises generating the reflection profile based on at least one of intensity and phase of the reflected light.

34. (Original) The method of claim 25, further comprising identifying a fault condition based on the determined misregistration.

35. (Original) The method of claim 26, wherein providing the wafer further comprises developing the photoresist layer to define the first and second grating structures prior to illuminating the first and second grating structures.

36. (Original) A processing line, comprising:

a photolithography stepper adapted to process wafers in accordance with an operating recipe;

a metrology tool adapted to receive a wafer processed in the stepper and having a first grating structure and a second grating structure formed in a photoresist layer, the metrology tool comprising:

a light source adapted to illuminate at least a portion of the first and second grating structures;

a detector adapted to measure light reflected from the illuminated portion of the first and second grating structures to generate a reflection profile; and

a data processing unit adapted to determine misregistration between the first and second grating structures based on the reflection profile; and

a controller adapted to determine at least one parameter of the operating recipe of the photolithography stepper based on the determined misregistration.

37. (Original) The processing line of claim 36, wherein the stepper is configured to pattern the first grating structure using a first photomask and pattern the second grating structure using a second photomask.

38. (Original) The processing line of claim 36, wherein the first photomask comprises a phase shift photomask and the second photomask comprises a binary photomask.

39. (Original) The processing line of claim 36, wherein the first grating structure comprises a first plurality of lines and the second grating structure comprises a second plurality of lines.

40. (Original) The processing line of claim 39, wherein the first plurality of lines is adjacent the second plurality of lines.

41. (Original) The processing line of claim 39, wherein the first and second plurality of lines are interleaved.

42. (Original) The processing line of claim 36, wherein the controller is further configured to determine at least one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, a reticle rotation parameter, a wafer rotation parameter, and a wafer non-orthogonality parameter in the operating recipe.

43. (Original) The processing line of claim 36, wherein the data processing unit is further adapted to compare the generated reflection profile to a library of reference reflection profiles, each reference reflection profile having an associated misregistration metric, select a reference reflection profile closest to the generated reflection profile, and determine the misregistration based on the misregistration metric associated with the selected reference reflection profile.

44. (Original) The processing line of claim 36, wherein the data processing unit is further adapted to compare the generated reflection profile to a target reflection profile and determine the misregistration based on the comparison of the generated reflection profile and the target reflection profile.

45. (Original) The processing line of claim 36, wherein the detector is further adapted to generate the reflection profile based on at least one of intensity and phase of the reflected light.

46. (Original) The processing line of claim 36, wherein the metrology tool comprises at least one of a scatterometer, an ellipsometer, and a reflectometer.

47. (Original) The processing line of claim 36, wherein the controller is further adapted to identify a fault condition based on the determined misregistration.

48. (Original) The processing line of claim 36, wherein the photoresist layer comprises an exposed photoresist layer.

49. (Original) The processing line of claim 36, wherein the photoresist layer comprises a developed photoresist layer.

50. (Original) A metrology tool adapted to receive a wafer having a first grating structure and a second grating structure formed in a photoresist layer, the metrology tool comprising:

a light source adapted to illuminate at least a portion of the first and second grating structures;

a detector adapted to measure light reflected from the illuminated portion of the first and second grating structures to generate a reflection profile; and

a data processing unit adapted to determine misregistration between the first and second grating structures based on the reflection profile.

51. (Original) The metrology tool of claim 50, wherein the first grating structure comprises a first plurality of lines and the second grating structure comprises a second plurality of lines.

52. (Original) The metrology tool of claim 51, wherein the first plurality of lines is adjacent the second plurality of lines.

53. (Original) The metrology tool of claim 51, wherein the first and second plurality of lines are interleaved.

54. (Original) The metrology tool of claim 50, wherein the data processing unit is further adapted to compare the generated reflection profile to a library of reference reflection profiles, each reference reflection profile having an associated misregistration metric, select a

reference reflection profile closest to the generated reflection profile, and determine the misregistration based on the misregistration metric associated with the selected reference reflection profile.

55. (Original) The metrology tool of claim 50, wherein the data processing unit is further adapted to compare the generated reflection profile to a target reflection profile and determine the misregistration based on the comparison of the generated reflection profile and the target reflection profile.

56. (Original) The metrology tool of claim 50, wherein the detector is further adapted to generate the reflection profile based on at least one of intensity and phase of the reflected light.

57. (Original) The metrology tool of claim 50, wherein the photoresist layer comprises an exposed photoresist layer.

58. (Original) The metrology tool of claim 50, wherein the photoresist layer comprises a developed photoresist layer.

59. (Original) An apparatus, comprising:

means for receiving a wafer having a first grating structure and a second grating structure formed in a photoresist layer;

means for illuminating at least a portion of the first and second grating structures with a light source;

means for measuring light reflected from the illuminated portion of the first and second grating structures to generate a reflection profile; and

means for determining misregistration between the first and second grating structures based on the reflection profile.

60. (Original) The apparatus of claim 59, further comprising:

means for comparing the generated reflection profile to a library of reference reflection profiles, each reference reflection profile having an associated misregistration metric;

means for selecting a reference reflection profile closest to the generated reflection profile; and

means for determining the misregistration based on the misregistration metric associated with the selected reference reflection profile.

61. (Original) The metrology tool of claim 59, further comprising:

means for comparing the generated reflection profile to a target reflection profile; and

means for determining the misregistration based on the comparison of the generated reflection profile and the target reflection profile.